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ABSTRACT

The regenerative model for the mathematics education of elementary school teachers that is presented is an interactive model that recognizes the need to consider local and national professional concerns as well as local preservice and in-service teacher concerns. A process for identifying and utilizing these concerns is described. Other models useful to the regenerative model that are discussed are: a research and development model that is biplanar and interactive; a data model concerned with data collection to aid in decision making; and a model to aid in the assessment and mapping of the needs and concerns of preservice teachers. Procedures for studying the needs of preservice teachers of elementary school mathematics are outlined. (MK)

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A Regenerative Model for the Mathematics Education of Elementary School Teachers

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A Regenerative Model for
the Mathematics Education of
Elementary School Teachers

In order to meet the needs of an ever changing society, great effort must be made to plan for the imminent programmatic changes. To be able to predict and plan for this certain change would take the gifts of a seer or the wit of a sheer genius using all the tools of modern statistical modeling. Unfortunately, educators are seriously deficient in both the gifts and tools of the aforementioned. Hence, educators must rely on indicators which were determined using somewhat less refined instruments.

One of the primary goals of education is that of avoiding becoming an anachronism. To do this the notion of regeneration has become the watchword. To make education self-regenerative and, hopefully, meet the changing needs, requires the examination of many components that influence the education process. All too often the indicators used to make decisions are based on reactive impressions garnered at a point in time. Although it is not possible to get objective impressions of respondents, it is possible and imperative to examine and evaluate some interactive impressions over time.

The process of evaluation is inherent in a regenerative model. By evaluation one means the determining of value or worth of a particular entity. Therefore, it is clearly possible for a program to be meeting its objective and goals and still be of little or no value. It is most appropriate to quote John Dewey who said, "the value which people will attribute to a new product or procedure will be a function of how well they think it will satisfy some recognized needs." Consequently, the greater the established need and the more convincing the relationship between the new means and the reduction of that

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need, the more highly the new means will be valued. Evidently, two cliches are being reiterated here: (1) people have to believe something will work before they will buy it, and (2) the end does not justify the means.

The work with pre-service and in-service elementary school teachers of mathematics tends to indicate serious concern between training needs and training received. There is serious concern as to whether to "buy" the strategies. This situation compounded by the student's attitude towards mathematics creates strong cognitive dissonance (Festinger, 1957). Some reasonable hypotheses thay may result are: (1) students feel relatively helpless without a feeling of direction and/or (2) students will choose a course of action that is most familiar to them.

The question is: What do pre and beginning teachers of elementary school mathematics value? Do students make use of their educational training to make rational decisions? Are the objectives of the program deemed valuable? Are the means used to meet the objectives valuable? It is questions like these that need to be considered in the regenerative model. However, the model is not a single-cell unit. It is an interactive model that must consider local professional concerns, national professional concerns, local in-service teacher concerns, and local pre-service teacher concerns.

INTERACTION OF CONCERNS MODEL

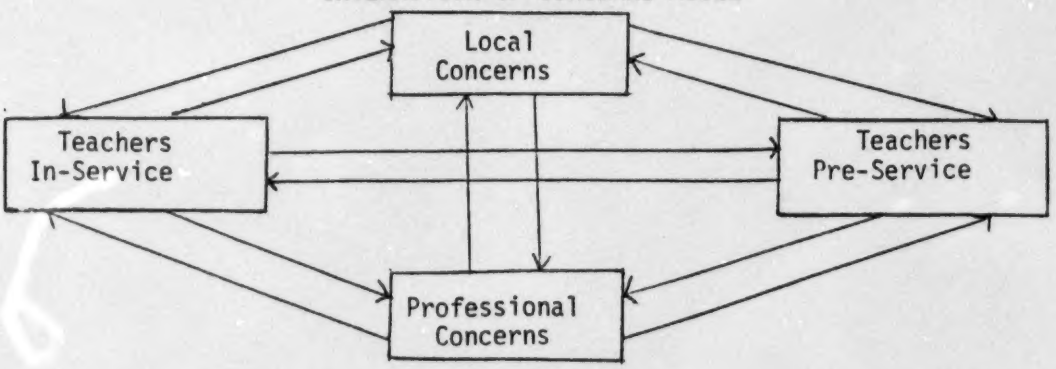


Figure 1

A process must be determined to identify and utilize these concerns. The process should include:

1. A data collection model - looking at each component separately and then interactively.
2. determing the priority.
3. determining the cost-effective alternatives to meet concerns.
4. comparing present cost-effective means and goals to the newly determined alternatives and concerns.
5. determining if change is reasonable at this time.
6. planning short-term and long-term implementation.

The interaction evaluative model will be more or less complete when both the what's and why's of value have been mapped. Basically, this is a proposed dichotomy for the thrust of a college's research and development effort.

The primary focus of the discussion in this paper thus far has been focused on the decision-oriented evaluative plane. This effort is more of a descriptive nature which tends to be delimited to find out what is of value. The second component of this research and development model is focused on the conclusion-oriented experimental research. The effort here is basically scientific which is aimed at generalizing and finding out why some entity should or should not be valued.

The proposed research and development model is biplanar (not mutually exclusive) and tend/and should be interactive as in the model below.

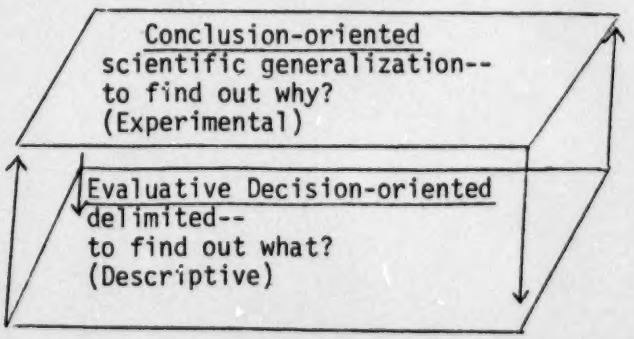
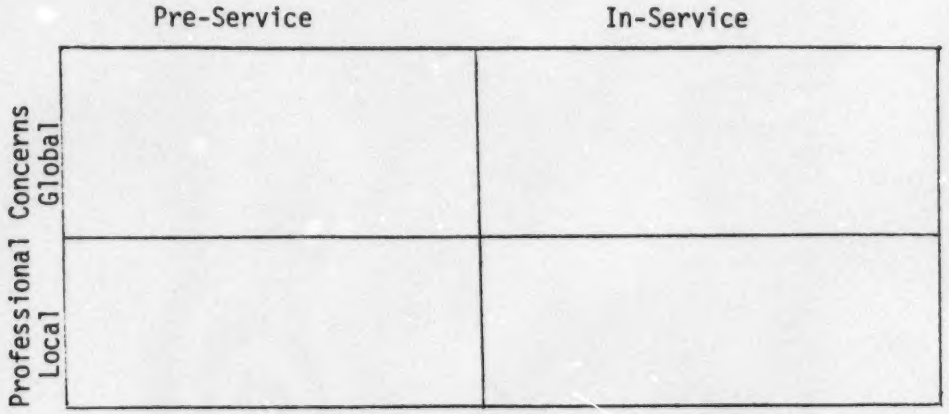


Figure 2

As was stated earlier in this paper, a data model must be established to foster the collection of data to aid the profession in making decisions consistent with the needs of change. A first effort is proposed here for one component of the data model for the evaluative plane. The data matrix would look something like this:



TEACHER CONCERNS (local)

Figure 3

The professional concerns deal with the goals and objectives perceived through delphi techniques or recommendations of the identified leaderships. The two levels of professional concerns are local to the university (serviced) community and the more global national and international consortia.

The teacher concerns deal with those concerns as identified by those individuals in the field in the university serviced community. The two levels here are pre-service clientele and in-service clientele of the university.

It is the teacher concerns data collection model that will be attended to here. First, let's examine the sources of this data. Figure 4 shows one possible flow of data:

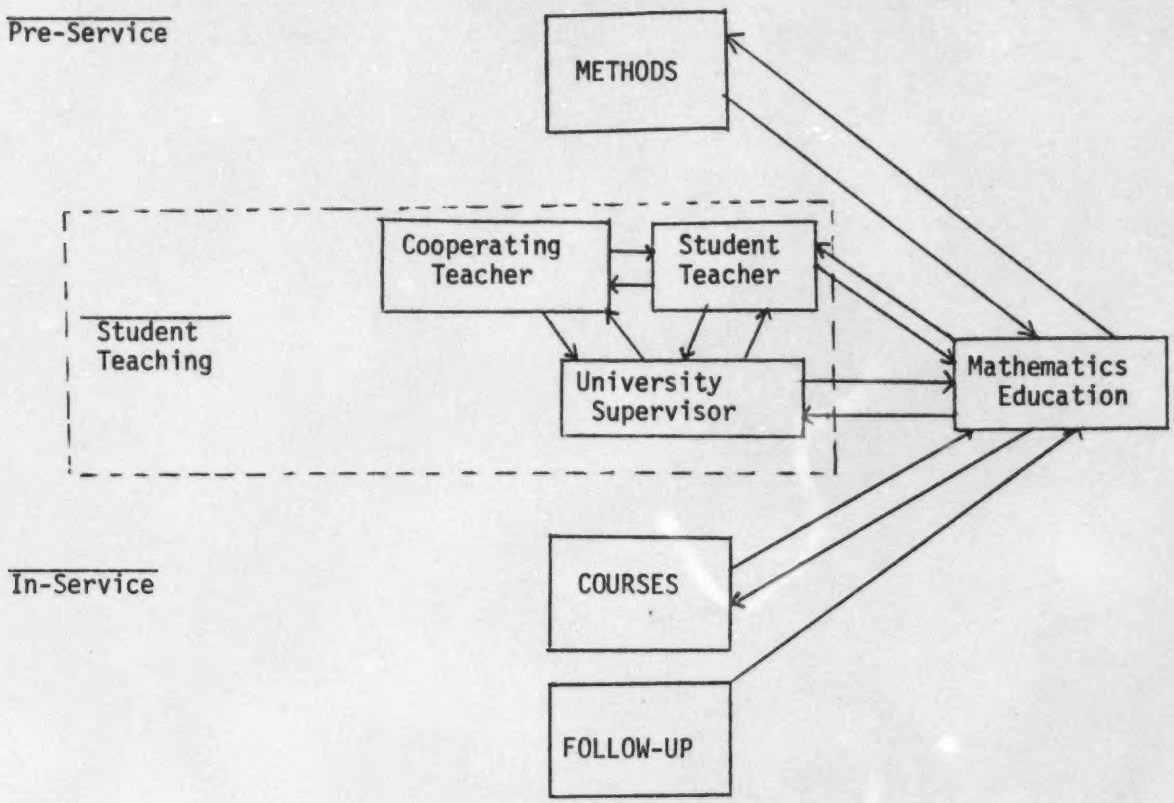


Figure 4

A first effort that needs to be tackled in respect to the teacher concerns data collection model is an assessment and mapping of the needs and concerns of the pre-service teachers of mathematics. This assessment and mapping would then be extended to the in-service teachers of mathematics.

The rationale for an assessment is to determine the needs. The rationale for the mapping is to identify, by target population, the specificity of these needs. There may or may not be a set of needs or concerns for urban populations as opposed to non-urban populations. There may or may not be a set of needs or concerns in respect to socio-economic groupings or ethnic populations. Without an assessment and without a mapping, there is extreme difficulty in determining the needs and concerns of lay teachers serviced by the university.

The question of process remains, however. A mean strategy is suggested by Figure 4. A value scale can be administered at the end of methods, after

student teaching, and during tenure as a classroom teacher. Also, a logging of concerns demonstrated by student teachers can be garnered from the student teacher directly, or indirectly through the university supervisor and the cooperating teacher. Similarly, this process would be replicated through contact with employed teachers through in-service work and courses. The result of the logs would permit a committee to synthesize these "felt" needs and incorporate such data in the design of instruments as well as in the decision-making process.

The goals of the decision-centered component of the research and development process would be to demonstrate reasonable correspondence between the means and components of the university and the valuing of these means and components by university clientele. The role of the university would then be that of change agent responding to the needs of change. The process for doing this would be the implementation of a smooth, comprehensive regenerative model.

The study should specifically examine and define a data collection model for prioritizing the perceived needs of pre-service teachers of elementary school mathematics in relation to the professional concerns of the local and global community. One should proceed as follows:

1. Design and administer to students a value scale reflecting local concerns in the teaching/learning of mathematics, pre-service teacher concerns in the teaching/learning of mathematics. The locally administered delphi and review of recommendations of the profession would supply the needed items for the professional component. A series of informal meetings with students would help in the identification of student concerns.

2. Design a strategy for using student teacher supervisors as data sources from students.

3. Meet with student teacher supervisors at the beginning of the semester to solicit their help and give direction.

4. Attend on-campus student teacher meetings several times during the semester and record the problems and concerns experienced by the student teacher.

5. Administer a value scale of professional concerns at the end of student teaching.

6. Test the change between the value scores at the end of the methods course and student teaching factorially.

7. Synthesize and map the concerns.